November 21, 2011

Via Electronic Submission

http://www.regulations.gov
Docket ID No. EPA–R08–OAR–2010–0406

RE: Comments of Great River Energy to Proposed Rule for the Approval and Promulgation of Implementation Plans; North Dakota; Regional Haze State Implementation Plan; Federal Implementation Plan for Interstate Transport of Pollution Affecting Visibility and Regional Haze (Docket ID No. EPA–R08–OAR–2010–0406)

INTRODUCTION

Great River Energy (GRE) is a not-for-profit rural electric cooperative, owned by 28 member cooperatives, who serve nearly 650,000 member consumers. GRE's system-wide load goes to a mix of industrial, commercial and residential customers including over 350,000 families.
GRE's mission is to provide reliable electricity at reasonable rates in harmony with a sustainable environment. GRE disagrees with the proposed Federal Implementation Plan (FIP) as it relates to GRE's Coal Creek Station (CCS) because: 1) it usurps the statutory discretion afforded to the State of North Dakota; 2) it is not cost effective; and 3) it will not result in perceptible visibility improvements in the affected Class I areas.

GRE's comments also incorporate additional detailed and refined analyses of SNCR costs and impact on ash re-use.[1] Lastly, we respond to EPA's request for comments on a NOx limit of 0.14 lb/mmBtu.

North Dakota has primary authority in setting BART limits for North Dakota affected units.

North Dakota has primary authority in establishing BART as defined by rule and as discussed in the Federal Register preamble. North Dakota has taken the necessary time and effort to craft a reasonable,

[1] In response to an information request from the State of North Dakota, GRE is providing a more detailed analysis of the NOx BART technology selective non-catalytic reduction (SNCR) as it applies to Coal Creek Station (the "Best Available Retrofit Technology Refined Analysis for NOx Emissions" or "Refined Analysis"). This detailed analysis, attached and incorporated herein, will be referenced throughout these comments. This detailed analysis confirms that the installation of SNCR at CCS is not cost effective based on thresholds established by North Dakota and approved by EPA.

technically sound, and appropriate State Implementation Plan (SIP). As such, EPA's proposed FIP, with respect to GRE's Coal Creek Station, usurps North Dakota's rights under the Regional Haze Rule.

EPA has affirmed the state's authority in establishing BART:

> Although we believe that these requirements [presumptive BART] are extremely likely to be appropriate for all greater than 750 MW power plants subject to BART, a State may establish different requirements if the State can demonstrate that an alternative determination is justified based on a consideration of the five statutory factors.[2] (emphasis added)
>
> Our presumption accordingly may not be appropriate for all sources. As noted, the NOx limits set forth here today are presumptions only in making a BART determination, States have the ability to consider the specific characteristics of the source at issue and to find that the presumptive limits would not be appropriate for that source.[3] (emphasis added)

It is clear from the preamble that EPA has afforded the states significant deference in developing their implementation plans and determining the appropriate level of BART emission controls required for each facility.

Cost effectiveness and visibility improvements are essential aspects of every BART determination.

EPA emphasizes that BART determinations should be both "cost effective" and "likely to result in a significant degree of visibility improvement":

> In addition, while States are not required to follow these guidelines for EGUs located at power plants with a generating capacity of less than 750 MW, based on our analysis detailed below, we believe that States will find these same presumptive controls to be highly-cost effective, and to result in a significant degree of visibility improvement, for most EGUs greater than 200 MW, regardless of the size of the plant at which they are located. A State is free to reach a different conclusion if the State believes that an alternative determination is justified based on a consideration of the five statutory factors. Nevertheless, our analysis indicates that these controls are likely to be among the most cost-effective controls available for any source subject to BART, and that they are likely to result in a significant degree of visibility improvement.[4] (emphasis added)

North Dakota finalized its SIP in early 2010 and made a BART determination for Coal Creek Station that the presumptive NOx emission rate of 0.17 lb/mmBtu, as applicable to tangentially-fired lignite units, was appropriate, consistent with the five statutory factors, and resulted in significant visibility improvement.

Upon receiving EPA's FIP on September 21, 2011, North Dakota requested that GRE provide a revised NOx BART analysis for CCS. EPA had conducted its own analysis based on its own assumptions and

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[2] Federal Register / Vol. 70, No. 128 / Wednesday, July 6, 2005 / Page 39131.

[3] Federal Register / Vol. 70, No. 128 / Wednesday, July 6, 2005 / Page 39134.

[4] Federal Register / Vol. 70, No. 128 / Wednesday, July 6, 2005 / Page 39131.

costs about ash handling, disposal and re-use resulting from the installation and operation of SNCR technology. Based on these ash assumptions and associated costs, EPA asserts that SNCR is cost effective. Consequently, North Dakota requested GRE to provide a more refined analysis to assist North Dakota in clarifying if SNCR is cost effective, as asserted by EPA in their FIP. While EPA offers reasonable comments and questions on GRE's SNCR analysis, the state is given significant deference in making the BART decision.

Great River Energy's Refined Analysis confirms that SNCR will have a detrimental impact on Coal Creek Station ash sales.

Great River Energy has provided several revisions and updates to our BART analysis over the last several years in response to various stakeholder questions and comments. The most recent information exchange occurred in the summer of 2011 and primarily dealt with ash disposal issues associated with installation of SNCR. With EPA proposing SNCR at Great River Energy's Coal Creek Station in its FIP, it is appropriate and necessary to look once more at the issue of SNCR's operational and cost impacts on ash re-use.

While the exact impacts to Coal Creek Station's ash are unknown, mandating SNCR will leave GRE in a vulnerable position where we would expect to incur significantly higher costs from lost ash sales and increased landfilling. Appendix C to the attached Refined Analysis, "Fly Ash Storage and Ammonia Slip Mitigation Technology Evaluation," provides a comprehensive assessment of ash implications associated with SNCR installation. The report provides three scenarios to characterize the range of impacts of ammonia on ash sales and disposal costs. This report illustrates that any ash impact costs add to the total cost of SNCR and make it less cost effective.

There are several social, economic and environmental benefits from re-using ash. As qualitative measures these additional risks are not outweighed by costs nor are they outweighed by the imperceptible improvements to visibility. Please refer to the attached Refined Analysis for more details on the risks and associated cost estimates of ash impacts.

The Refined Analysis demonstrates that the installation of SNCR will not result in perceptible visibility improvements in North Dakota's Class I areas.

The Regional Haze Rule and BART requirements have a goal of reducing man-made impacts on Class I areas to reach natural background by 2064. EPA acknowledged that 0.5 deciviews is imperceptible to the human eye. From GRE's BART analysis, it can be estimated that the incremental deciview improvements associated with the installation of SNCR would range from 0.109 to 0.207, which are well below what EPA has established is a perceptible level to the human eye.

In addition, it is worth noting two facts. First, combined utility NOx emissions in North Dakota represent approximately only 6% of total NOx emissions[5]. As such, it is understandable that proposed and additional BART NOx reductions from North Dakota utilities do not provide more visibility improvements in the Class I areas. This makes sense because 94% of the NOx contribution is not related to North Dakota utility sources. Second, ammonia contributes to Regional Haze, in that it bonds with oxides of nitrogen and sulfur dioxides to form ammonium nitrates, and ammonium sulfates,

[5] Federal Register / Vol. 76, No. 183 / Wednesday, September 21, 2011.

respectively. Although outside the scope of this analysis, it is quite possible that additional ammonia release (slip) from the proposed SNCR for Coal Creek may offset the relatively minor NOx reductions proposed by EPA.

Great River Energy firmly states that the proposed 0.14 lb/mmBtu NOx emission limit is unachievable with LNC3+.

EPA's proposed FIP invites comment on a NOx emission limit of 0.14 lb/mmBtu for CCS. GRE firmly believes that 0.14 lb/mmBtu cannot be achieved with LNC3+ and DryFining™, and would trigger installation of SNCR. In support, GRE presents three comments on the proposed 0.14 lb/mmBtu NOx emission limit.

GRE Comment #1 on 0.14 lb/mmBtu - NOx limits should be expressed on an annual basis rather than a 30-day basis. Great River Energy presented two "low NOx burner" options in its final BART analysis, based upon vendor estimates. One technology estimated an emission rate of 0.17 lb/mmBtu and the other technology estimated an emission rate of 0.15 lb/mmBtu. Great River Energy chose to pursue the more effective NOx technology on CCS Unit 2, and has been developing operational history since 2008. As a general comment, permitting authorities have historically used vendor guarantees as the basis for creating firm permit limits. However, vendor guarantees are provided for specific operating conditions. These conditions are very specific and do not cover the full spectrum of operations such as variable load, startups, or shutdowns, as just a couple of examples. The estimated BART emission rates should be viewed as annual averages, and not as 30-day rolling limits. This statement is confirmed by GRE's operational history in Attachment 1. The attachment illustrates Unit 2's operating history with the installation of LNC3+, and DryFining™ coal drying technology. It is important to note that while an emission rate of 0.14 lb/mmBtu was achieved for some period of time it is not a sustainable number on a 30-day rolling basis.

GRE Comment #2 on 0.14 lb/mmBtu – Circumferential cracking limits the extent and duration of LNC3+'s ability to reduce NOx. As noted, GRE has proactively installed second generation SOFA/LNB (LNC3+) on CCS Unit 2, well in advance of the BART requirements. As such, GRE is uniquely positioned to comment on a proposed 30-day rolling NOx emission rate of 0.14 lb/mmBtu. Although GRE has demonstrated in the past an annual emission rate of 0.146 lb/mmBtu, GRE firmly states that the presumptive emission limit of 0.17 lb/mmBtu is the appropriate BART limit for the LNC3+ because it contributes to circumferential cracking.

Installation of the second generation LNC3+ technology in 2008 on Unit 2, contributed to circumferential cracking on the boiler tubes as operators attempted to maintain low NOx emission rates. Circumferential cracking occurs in the reducing zone between the coal nozzles and the overfire air (OFA) registers. In 2008, GRE lowered NOx emissions in Unit 2 by expanding the OFA registers to divert more of the combustion air from the burners of the boiler to an area about 30 feet higher in the boiler. In doing so, the flame temperatures were lowered, which reduced the production of NOx generated by the combination of oxygen and nitrogen gas burned under high temperatures. Circumferential cracking was an unexpected deleterious side effect of the expanded OFA registers.

The implementation of the DryFining technology has allowed CCS to operate at lower NOx levels which could not be demonstrated with the LNC3+ alone. Upon completion of commissioning in early 2010, operators again tested the lower end of NOx operations on Unit 2 and again experienced problems with circumferential cracking. It has accelerated tube leaks in Unit 2 and has required some

unplanned outages. These operational risks have not been estimated as a cost and are not included in the Revised Analysis. While it has been possible to operate at lower NOx emission rates, during ideal conditions, the risk of circumferential cracking increases significantly when operating at these lower rates. An emission rate between 0.14 and 0.17 lb/mmBtu for LNC3+ and DryFining is not consistently achievable as a 30-day rolling emission limit.

GRE has pursued several corrective actions to maintain lower NOx emission rates, while minimizing circumferential cracking. These have included:

- detailed examinations of the boiler tubes to detect the extent of the cracking,
- the installations of additional temperature monitors to determine boiler wall temperatures, and
- tuning of the boiler to minimize the circumferential cracking in the zone of concern.

Based on our analysis of work done to date, it is not clear how to eliminate the thermal spikes through operating practice, except to ensure that the burner system is tuned to avoid large variations in burner specific fuel/air ratios, adequate coal fineness, excessive wall blowing, and boiler operation at the highest stoichiometric ratio consistent with NOx emission goals. Efforts continue to further reduce this circumferential cracking problem.

These efforts have reduced unscheduled outages caused by circumferential cracking, but have required operation at slightly higher NOx emission levels. See Attachment 1.

It is clear from our experience that reducing NOx emissions to the absolute limits of the LNC3 and DryFining technologies results in collateral damage to our boilers. Our operating experience demonstrates that there are distinct limits to this technology. GRE has proposed to continue to conduct combustion optimization tests, in an effort to further lower NOx emissions with the LNC3 technologies. These additional reductions may eventually be successful and could then potentially be used to mitigate the expected effects of startup/shutdown emissions as well as variable load operations, as inclusive in a 30-day rolling limit. For the purpose of a final 30-day rolling NOx BART limit, GRE firmly believes that 0.17 lb/mmBtu is the most stringent level.

GRE Comment #3 on 0.14 lb/mmBtu – EPA's recent analyses demonstrate that 0.14 lb/mmBtu is not achievable even with SNCR. GRE has reviewed EPA's projections on low NOx burner capabilities, and SNCR capabilities in the Cross State Air Pollution Control Rule (CSAPR). From a review of EPA modeling information from the CSAPR docket, there are currently no tangentially-fired utility electricity generating units, in the CSAPR-affected states, with LNC3 combustion controls and selective non-catalytic reduction (SNCR) post-combustion controls that operate at or below the presumptive BART limit of 0.17 lb/mmBtu for NOx.

While reviewing the CSAPR docket for comparable technologies and associated emission rates, GRE discovered that the levels originally stated "as achievable" in the BART submission of 2007 have not been demonstrated utilizing LNC3 and OFA. In a comparison of existing units of similar design, data from the recently proposed CSAPR at Docket ID EPA-HQ-OAR-2009-0491 illustrates that there are currently no tangentially-fired utility electricity generating units with LNC3 combustion controls and selective non-catalytic reduction (SNCR) post-combustion controls that operate at or below the presumptive BART limit of 0.17 lb/mmBtu for NOx. Details of our findings are presented in Section 2.1.3 of the Refined Analysis.

In EPA's own annual NOx emission projections on SNCR and low NOx burner (LNB) units, there are only 4 units capable of achieving <0.14 lb/mmBtu, and they are all supercritical units with LNBs and SNCR. Therefore, since CCS does not have supercritical boilers and since there is no other example of a tangential-fired source with only LNBs, it is unrealistic to expect an annual average lower than 0.14 lb/mmBtu, much less a 30-day rolling emission limit of 0.14 on LNB alone. And further, as supported by the Refined Analysis, CCS may be able to meet 0.12 lb/mmBtu as an annual average with SNCR. So, the 0.14 lb/mmBtu emission rate would potentially be achievable only after installation of SNCR with LNC3. As demonstrated in the Refined Analysis, SNCR is not cost-effective based on thresholds established by NDDH and already approved by EPA.

GRE's experience demonstrates that the most advanced LNC3 configuration cannot achieve a 30-day rolling limit of 0.14 lb/mmBtu, which is supported by EPA's own CSAPR modeling as annual averages. This emission limit could only be met through installation of SNCR and LNC3, which is not cost-effective as described in the Refined Analysis.

Conclusion

Great River Energy has refined its BART NOx analysis for CCS by updating the SNCR capital and operational costs. These updated costs were performed by URS after careful consideration of site specific information and while using updated cost information. In addition, Great River Energy contracted with Golder Associates to review and update assumptions pertaining to ash implications of SNCR. When combined, these updated values confirm that SNCR is not cost-effective, consistent with EPA's presumptive NOx analysis and consistent with North Dakota's cost-effective thresholds, as approved by both EPA and North Dakota.

As discussed, North Dakota has the authority under the Regional Haze Rule to review these refined analyses and ultimately determine the appropriate BART emission level for Coal Creek Station. We are confident that North Dakota will reach the same conclusion that we have reached, which is that the emission rate in the proposed FIP, which would require the use of SNCR technology, is not BART. Instead, Coal Creek Station will meet the presumptive BART emission level of 0.17 lb/mmBtu, through installation of LNC3, in addition to our novel DryFining technology.

EPA has also requested comment on a BART emission rate of 0.14 lb/mmBtu. Since CCS cannot achieve this 30-day rolling emission rate without installation of SNCR, it should not be considered as an appropriate BART emission level. As identified, this is consistent with EPA's own determination that a presumptive BART emission level of 0.17 lb/mmBtu is cost-effective and will result in significant visibility improvement. As demonstrated in these comments and the associated Refined Analysis, any additional NOx reductions would neither be cost-effective nor would result in perceptible visibility improvement in North Dakota's Class I areas.

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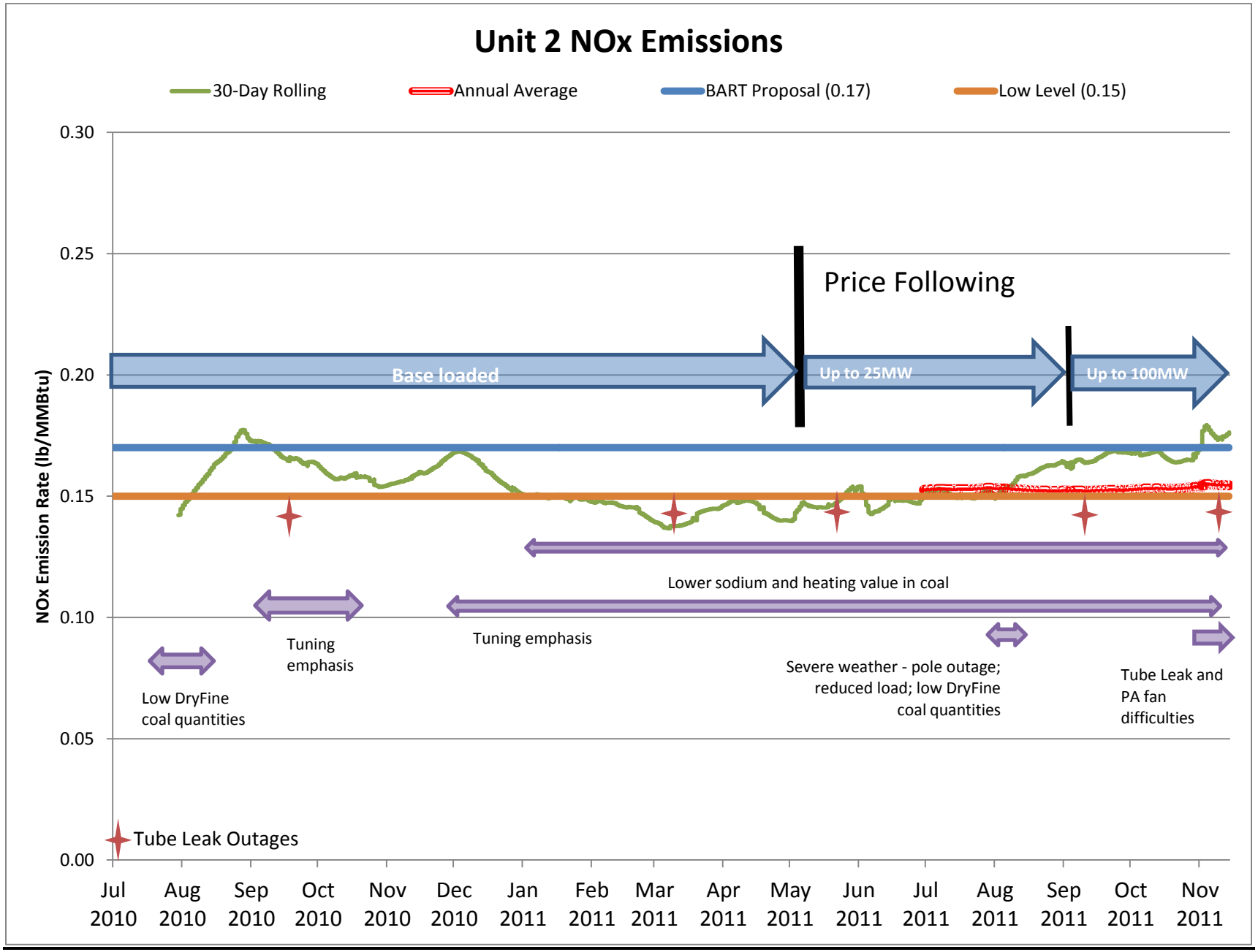
Attachment 1


Unit 2 NOx Emissions
30-Day Rolling
Annual Average
BART Proposal (0.17)
Low Level (0.15)
NOx Emission Rate (lb/MMBtu)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Price Following
Base loaded
Up to 25MW
Up to 100MW
Lower sodium and heating value in coal
Tuning emphasis
Tuning emphasis
Low DryFine coal quantities
Severe weather - pole outage; reduced load; low DryFine coal quantities
Tube Leak and PA fan difficulties
Tube Leak Outages
Jul 2010
Aug 2010
Sep 2010
Oct 2010
Nov 2010
Dec 2010
Jan 2011
Feb 2011
Mar 2011
Apr 2011
May 2011
Jun 2011
Jul 2011
Aug 2011
Sep 2011
Oct 2011
Nov 2011